The treatment which now gives promise of most general applicability and efficiency is the spraying of the plants with a solution of sulphate of copper (blue-stone) or with one of the preparations in which it is the important ingredient, known as "eau celeste," "Bordeaux mixture," etc. It seems very possible, too, that plants may be fortified against the attacks of parasitic fungi, or their susceptibility to such attacks be largely diminished, by special fertilization, for the purpose of introducing into the plant substances which, while not interfering with its growth, shall make it a less congenial soil for the growth of fungi. The line of investigation here suggested has not yet been followed out, although it offers an opportunity for chemico-physiological work which may yield important results. It is obvious, also, that a vigorously healthy plant will resist the fatal influence of parasites far better than a poorly nourished one.

Much may be done, after a plant is too far gone to be saved, to prevent further spread of the disease, by removing and destroying the diseased parts. It is not sufficient, however, to throw the portions removed into the rubbish-heap: the spores must be actually destroyed, and this can be effectually done only by burning. A considerable number of fungi produce, in the plants on which they live, resting-spores, which ordinarily remain on or near the ground in dead leaves or stubble, survive the winter, and, germinating in the spring, infect the new growth. In these cases the danger of a severe attack in the following year can be greatly lessened by clearing up and burning all such sources of infection.

Numerous instances can be cited of more or less common weeds or wild plants so closely related to certain cultivated plants that they are liable to the attacks of the same fungi, and so serve to perpetuate those fungi, and to infect the related cultivated plants when growing near. Evidently, then, such plants should be carefully and thoroughly exterminated wherever they may prove a source of danger.

Professor Humphrey then went on to speak of the application of the foregoing facts and principles in the consideration of a few particular fungous diseases.

W. T. DENNIS, commissioner of fisheries for Indiana, has issued a call for a State convention of the disciples of the rod and reel, and dog and gun, to meet at Indianapolis, Ind., on Thursday, Dec. 19, at noon.

A NEW RECORDING PRESSURE-GAUGE.[1]

IN designing the recording pressure-gauge herewith illustrated, the object was to produce an instrument which would be fundamentally simple, and consequently reliable, and which could be placed upon the market at a moderate cost.

Fig. 1 represents the instrument complete, and ready for application. Fig. 2 shows the pressure-tube with the inking-pointer attached; the front of the case, dial, and cover of clock, being removed. The pressure-tube *A* is of flattened cross-section, and bent into approximately a sinusoidal form. A flexible strip *B*, of the same metal as the tube, is secured at the ends and along the bends, as shown in Fig. 2. The bent tube may be considered as a series of Bourdon springs placed end to end.

Pressure applied to the tube produces a tendency to straighten each bend, or collectively to elongate the whole. This tendency to lengthen the tube is resisted by the flexible strip *B*, and thereby converted into a multiplied lateral motion. The inking-pointer is attached directly to the end of the pressure-tube, as shown in Fig. 2, from which it will be seen that the usual mechanism and multiplying-devices are dispensed with, since the motion of the tube itself is positive and of sufficient range. The special advantage of this is evident, considering that in all other pressure-gauges the movement of the tube or diaphragm is small, and requires a system of mechanism to multiply the motion many times before it is available for indicating purposes. These multiplying-devices must be delicately constructed and properly cared for, and even under the most favorable conditions they are liable at any moment to be a source of error.

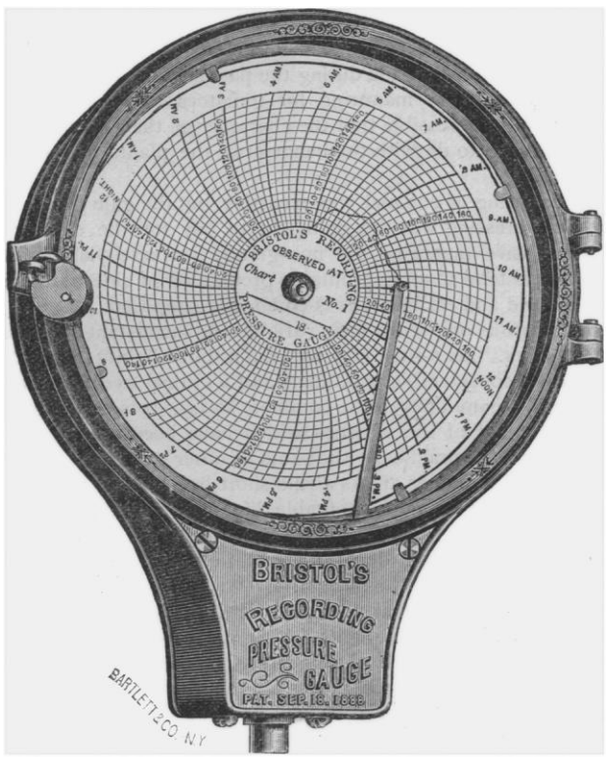

FIG. 1.

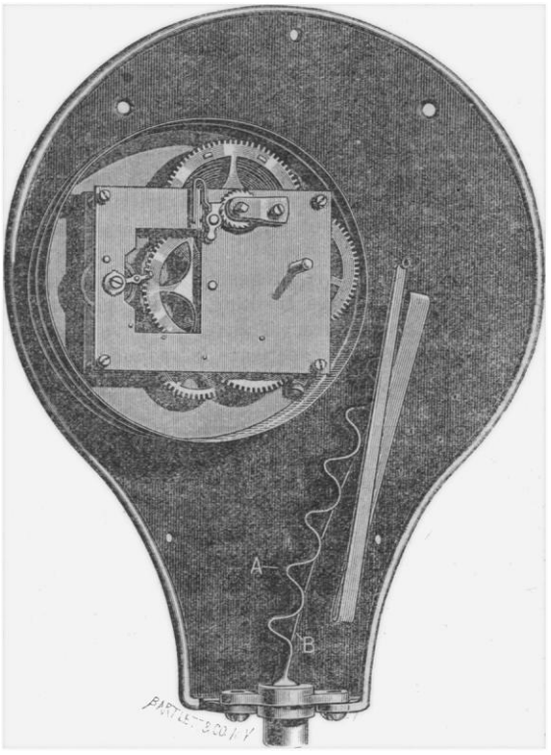

FIG. 2.

In the instrument illustrated the tube is designed for a range of one hundred and eighty pounds per square inch; for other ranges its sensitiveness may be varied at will by changing its proportions, as length, shape of cross-section, or thickness. The printed charts for receiving the record make one revolution in twenty-four hours, and are provided with radial arcs and concentric circles, the divisions on the radial arcs corresponding to differences in pressure; while those on the concentric circles correspond to the hours of the day and night.

During the past year and a half, several of the instruments have

[1] Paper read by W. H. Bristol of Hoboken, N.J., before the American Society of Mechanical Engineers, at its meeting, Nov. 21, 1889.

been in operation upon the steam-boilers at Stevens Institute, and have given perfectly satisfactory results.

In regard to making the tubes alike, it will be well to state that there has been no difficulty in producing a number in which the deflections were equal for equal pressures, and which have been directly applied to a standard chart, without adjustment. It will be readily seen, that, in case there should be slight differences in the deflections, such differences may be allowed for by raising or lowering the tube with reference to the dial. This is equivalent to shortening or lengthening the deflections along the radial arcs. For an indicating instrument, it is only necessary to provide a graduated arc for the end of the tube to move over.

It is evident that the instrument is adapted for a vacuum as well as for a pressure-gauge, and it naturally follows, that, if sufficiently sensitive, it will serve as a barometer, and measure changes of atmospheric pressure.

The model herewith exhibited for this purpose was made by electro-deposition of nickel upon a piece of solder of the proper form, the solder being afterward melted out in oil. The walls of this tube are $\frac{1}{500}$ of an inch thick. When this tube is exhausted of air and sealed, as shown, it gives a deflection of about three inches and a half for an external change of pressure of one atmosphere.

Another application of the pressure tube is in the recording thermometer. The tube may be filled with a very expansible liquid, such as alcohol, and sealed. Variations in temperature produce expansion of the enclosed liquid, which, in turn, gives deflections of the tube to correspond. These deflections may be used to record directly, without multiplying-devices, as shown in one of the models.

The tubes of the pressure-gauges to be inspected have been made by the writer at Stevens Institute, for the purpose of thoroughly testing the novel form. The results have been perfectly satisfactory, and our recent experience in manufacturing has demonstrated the possibility of duplicating the tubes in quantities for a standard chart.

NOTES OF TOMATOES.

PERHAPS the most frequent and noteworthy observation made upon the culture of the tomato during several years of experimentation with the plant at the Cornell Agricultural Station has been the great increase in vigor and productiveness which comes from careful handling and good tillage. It often appears as if this vigor is not only characteristic of the immediate generation, but that it is hereditary for a time to a profitable degree. "Handling" or transplanting of young plants, when frequently and properly done, is invaluable; and, so far as the plant is concerned, three or four transplantings are better than one. In the station work, in order to get the greatest results from tests, the plants are handled in pots, preferably rose-pots, and are transplanted several times. The handling is expeditious, and is not too expensive for the use of any one who grows tomatoes for home use. For market culture they find that two transplantings are usually profitable. Stocky plants, vigorous, and growing rapidly, are better than simply early plants, however; and frequency of transplanting must not be confounded with early sowing and consequent necessity for several shiftings. Tomato-plants — or any plants, in fact — should not be shifted for the simple purpose of preventing crowding or "drawing." Transplanting serves the purpose of maintaining a steady and symmetrical growth, and it should occur before the plant becomes checked from neglect. A good tomato-plant at the time of setting in the field, is one which is stocky enough to hold the weight of the earth and pot when a number of plants are grasped in the hand by their tops, and are carried along the rows. They require no staking when set. A tall and weak plant with a blossom on the top is not considered worth setting. It is a common mistake to set tomato-plants in the field too early. Cold nights, even though several degrees above frost, check the plants, sometimes seriously.

How early the plants should be started for profit is a question which demands attention. A few writers have maintained of late that nothing is gained in earliness and productiveness by early starting under glass. This is undoubtedly true if the early plants are not well grown, but the Cornell experience is quite to the contrary with stocky and vigorous plants. Whether this increase is worth what it costs, is a question which must be answered by every grower for himself.

In every instance the early-sown plants gave earlier fruits than the others; and in every case but one, in which the yields were practically the same, the total yield is much greater. The gain in earliness sometimes amounts to three or even four weeks. The disadvantage of very late planting (middle of May) is particularly pronounced in the results at Cornell, especially in point of productiveness. This productiveness, however, is really a measure of earliness, inasmuch as it simply records the weight of fruit which had ripened up to Oct. 10, when the tomato season was closed by frost. Could the season have been sufficiently extended, no doubt the ultimate productiveness of the varions plantings would have been the same.

It is a common notion that soils containing little or no manure are preferable to well-enriched soils for tomato-growing. It is supposed that rich soils tend to make vine at the expense of fruit, causing lateness of maturity and consequent lessening of yield; and the supposition is prevalent that rich soils tend to make fruits "rougher," or more irregular in shape. A careful test upon these points has been made during the past season at Cornell, with the result that heavy manuring for tomatoes may give decided benefits; yet it is possible that the character of the soil or season may have much to do with the behavior of the plants under these conditions.

The manuring of one plat was excessive, but the gain due to the very heavy dressing was not sufficient to pay for the extra cost. But if excessive manuring did not greatly increase yield, neither did it always tend to an unprofitable production of vine at the expense of yield and earliness, as is commonly supposed.

The tomato is one of the most variable and inconstant of kitchen-garden plants. As a rule, varieties differ but slightly from their allies, and a considerable plantation and a critical eye are needed to determine many of even the common sorts. It is certainly true that at least half of the varieties which have been offered in the last few years are practically the same as other varieties.

Varieties of tomatoes are as a rule short-lived. Ten years may be considered the average profitable life of a variety, and many sorts break up and disappear in two or three years. This inconstancy of type is largely due, no doubt, to the haste with which new sorts are put upon the market.

The demand in tomatoes now calls for fruits which are regular in shape, solid, large, and plants which are productive. The old angular sorts are rapidly disappearing in commercial practice. There has been no gain in earliness for the species for many years, if at all, and little if any need be expected. The cherry and plum sorts, with a few of the angular-fruited and wrinkled-leaved varieties, are still the earliest sorts. Yet comparative earliness between commercial varieties is an important consideration. There is also no gain in capability to resist rot: the cherry, plum, and angular sorts are still most exempt, the cherry and plum varieties entirely so.

An experiment was undertaken to determine if keeping qualities are correlated with solidity. Representative samples of many varieties, taken so far as possible in the same stage of maturity, were placed together upon a forcing-house table, and the fruits were removed as soon as they began to decay. It was found that some of the frailest varieties kept the longest. It appears, therefore, that solidity must be measured by a general judgment rather than by any definite expression. This conclusion is quite at variance with common opinion.

Much has been said concerning the superiority of certain varieties for cooking purposes, aside from quality of fruit. There is said to be characteristic differences between varieties in time of cooking and amount of shrinkage. A painstaking cooking test was made with a few varieties, but the results are so variable as to appear to be merely accidental or characteristic of individual fruits. The fruits were cut into thin slices and placed in boiling water. The shrinkages in weight and bulk do not appear to be correlated. In some instances shrinkage was slight, while in other varieties, equally as solid and good, it was great.